Designing and Implementing Field Experiences through Distance Learning

Saturday Seminar
May 30, 2020
News & Announcements

- Master Spreadsheet: https://docs.google.com/spreadsheets/d/1LomGkHOIp1TfsTZNRZFNReqo7cTcABNmWM9_OGULD8/edit#gid=0
  - Currently about 39 activities
  - Very interested in feedback from those using these (or any other) activities that might help future instructors
- ACUE's toolkit for effective online instruction (contributed by Karen Gran)
  - https://acue.org/online-teaching-toolkit/
- Next Saturday Webinar 6/13
- GSA/NAGT Tech Webinar series coming soon!
First Reflections on Delivering a Virtual Field Camp

Bob Krantz
Fort Lewis College, Durango, Colorado
May 2020
Module Focus: Mapping and 3D Fault Analysis

- North Moab Fault System
- ~4 square km area with excellent exposure
- Basic geologic mapping
- 5 geologic cross sections
- Stereonet analysis
- Fault geometry and displacement analysis
- 3D block diagram of faults
FLC Virtual Field Camp Delivery Methods, May 18-22

- All distance learning
- Google Earth platform
- Field photo album with locations
- Geologic station locations
- Station data lists
- Google Earth “project” with imbedded material
- Monday to Friday schedule with synchronous group sessions and independent work and communications
- Attempt to create game feel
Student Performance and Assessment

- All students delivered maps, sections, analyses, and block diagrams with essential content
- Performance varied by experience and background, grade range 75 to 90%
- Engagement varied by personality and situation
- Understanding and application of geologic reasoning most uncertain
Evaluating the Virtual Experience

- Only a few students embraced the virtual field geology as a game.
- Some students struggled with 3D relations, perhaps not putting themselves into the map area context.
- Most students attempted to “solve” for map making via naïve interpretation of information provided, especially station data.
- This mapping approach avoids thinking like a geologist, using geologic reasoning to relate observations and concepts, and translate the rock expression into a mental model (and a map).
- The approach perhaps also presumed (and made it more difficult to model) expert methods for novices.
- As delivered, this module did not directly encourage geologic thinking.
Making Virtual Field Camp Better

- A virtual field camp, especially as a capstone experience, must inspire geologic thinking and applications
- The virtual experience should also encourage some degree of immersion and personal engagement
- The experience should make the rocks, and first order interpretation, the primary focus
- Potential strategies:
  - Represent the rocks as realistically as possible and as the first source of information
  - Require student plans for geographic and geologic navigation and investigation
  - Provide field data and other information by request
  - Have more discussion (interrogation?) about what a student “sees”
  - Model expert thinking and methods more
  - Improve the game delivery and engagement (and rely less on a stand-alone resource)
Joe Meert
Mapping exercise at Ghost Ranch, NM, with GoogleEarth Pro
Ghost Ranch Mapping Project

**Flexible:** UF Students will complete map, cross-section and stratigraphic column using Illustrator/Corel. Can be split up and completed on paper or other method

**Files:** Many, included are high-res photos keyed to .kml files, 4 kml files, video explaining appearance of each unit/erosional profile, UF instruction sheets (docx), ai, cdr files of topo sheet, NGS topo overlay, Learning outcomes, photo keys

**Brief Geology:** Mesozoic, flat-lying strata Chinle, Entrada, Todilto and Summerville. Numerous faults, 2 big faults easy to see on google earth/air photos. Smaller faults hinted at in photos and are easy to map.

**Software:** GoogleEarth, Drawing Package, Stereoplot Software, Excel
Charly Bank
Magnetometry at Home
Magnetometry at home: a hands-on survey with your smartphone

Charly Bank, University of Toronto, Canada

- introductory activity
- discussion with NAGT Virtual geophysical field experiences Working Group (Beth, Ian, Cynthia, Robert, Chris, Mike,...)
- students need
  smartphone with free magnetometer app (for iOS or Android, https://www.vieyrasoftware.net/)
  a magnetic object (fridge magnet, car)
  tape measure is optional
- students can run activity inside home, in driveway, on a parking lot, a park,...
example: decay of magnetic field from a fridge magnet

1. your objective
2. considerations
   (date?, conditions?, working alone or in team?)
3. location (GPS, description, map)
4. survey setup
   length of profile, how many data to measure
5. measurements
   record over time or screenshots at distances
6. description of data:
   total field maximum and background
   where is total field above background?
   error
7. preliminary interpretation (decay with $r^{-3}$)
8. archiving data
   spreadsheet with data, directory with screenshots
   short reflection

**assessment** using "single-point" rubric
- flexible to address range of possible surveys
- opportunity to discuss what may be excellent

<table>
<thead>
<tr>
<th>component \ level</th>
<th>developing</th>
<th>competent</th>
<th>excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>objective \ of 3</td>
<td>0-1 pt</td>
<td>2 pts</td>
<td>3 pts</td>
</tr>
<tr>
<td>documentation \ of 6</td>
<td>0-2 pts</td>
<td>3-5 pts</td>
<td>6 pts</td>
</tr>
<tr>
<td>survey \ of 4</td>
<td>0-1 pt</td>
<td>2-3 pts</td>
<td>4 pts</td>
</tr>
<tr>
<td>results and interpretation \ of 3</td>
<td>0-1 pt</td>
<td>2 pts</td>
<td>3 pts</td>
</tr>
<tr>
<td>archive \ of 4</td>
<td>0-1 pt</td>
<td>2-3 pts</td>
<td>4 pts</td>
</tr>
<tr>
<td>total: \ of 20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
activity may be used
- for a virtual geophysics field camp.
- as preparation before heading to field camp, and/or
- as hands-on exercise in an intro geophysics course

activity has been posted to SERC website
introduces several of the learning outcomes:

1. Design a field strategy to collect or select data in order to answer a geologic question.
2. Collect accurate and sufficient data on field relationships and record these using disciplinary conventions (field notes, map symbols, etc.).
3. Synthesize geologic data and integrate with core concepts and skills into a cohesive spatial and temporal scientific interpretation.
4. Interpret earth systems and past/current/future processes using multiple lines of spatially distributed evidence.
5. Develop an argument that is consistent with available evidence and uncertainty.
6. Communicate clearly using written, verbal, and/or visual media (e.g., maps, cross-sections, reports) with discipline-specific terminology appropriate to your audience.
7. Work effectively independently and collaboratively (e.g., commitment, reliability, leadership, open for advice, channels of communication, supportive, inclusive).
8. Reflect on personal strengths and challenges (e.g. in study design, safety, time management, independent and collaborative work).
9. Demonstrate behaviors expected of professional geoscientists (e.g., time management, work preparation, collegiality, health and safety, ethics).
Karst Hydrogeology: A virtual field introduction using Google Earth and GIS

Rachel Bosch
University of Cincinnati
Sotano de las Colondrinas.
Water flow near Aquismón, San Luis Potosí, Mexico

- Rule of V’s
- Karst is complex!

Sharing science

- Group presentation
- Individual written report
Ben van der Pluijm
Google Earth Web-based Maryland Appalachians Geology field trip